

NISTTech

X-Ray Photoelectron Emission Spectrometry System

Easily determine thin layer thickness in multi-layer samples

Description

Use this easy x-ray photoelectron emission method for analyzing layer interfaces and determining thin layer thickness in multilayer samples. The apparatus and method determines the concentrations of specific elements in different chemical states at varying depths in samples, especially those consisting of thin film layers. The apparatus precludes distortions of x-ray photoelectron emission spectra caused by a rotating sample, a movable electron spectrometer, or a movable entrance slit between them.

Applications

- **Chemical analysis**
Advantageous for analyzing photoemission lines measuring very small changes in the chemical environment.

Advantages

- **Eliminates or reduces energy distortions**
Eliminates energy distortion due to changes in the relative motion of the sample with respect to the spectrometer. Greatly reduces energy distortion due to a large angle of incidence. Reduces lineshape distortions due to inelastic electron scattering of exiting photoelectrons.

Abstract

A system is disclosed for performing x-ray photoelectron emission analysis which uses a collimated x-ray beam directed to an optically polished sample at a small grazing angle of incidence, a fixed sample/electron spectrometer geometry, and an x-ray detector for detecting x-rays reflected off of the sample. With the system, an enhancement of the x-ray field at layer interfaces in a multilayer sample can take place. The system permits depth profiling of an over layer on a substrate, such as a metal or metal oxide on a metal substrate. The enhancement permits absolute calibration of depth-dependence. The system reduces lineshape distortions due to inelastic electron scattering of exiting photoelectrons and eliminates energy distortions due to changes in the sample position relative to the focal point of the electron spectrometer.

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References

- Expired U.S. Patent # 5,280,176 issued
- Docket: 91-007US

Status of Availability

This technology is available in the public domain.

Last Modified: 07/27/2011